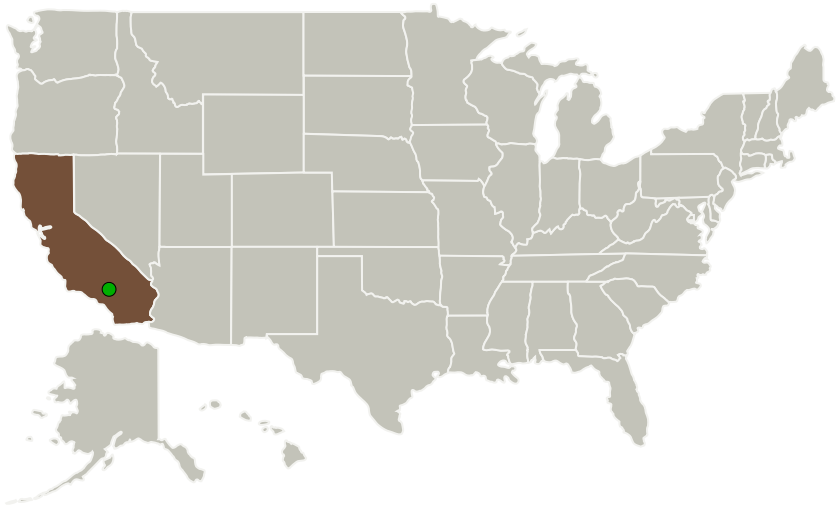
Advanced Modular, Multi-Channel, High Speed Fiber Optic Sensing System for Acoustic Emissions Monitoring, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

Intelligent Fiber Optic Systems Corporation (IFOS) proposes to prove the feasibility of innovations based on ultra-light-weight, ultra-high-speed, multi-channel, optical fiber sensor system for acoustics emissions (AE) monitoring for detection of impact damage and cracks in structural components in Aerospace structures. The project goals are to design an ultra-high-speed/high resolution with a small foot print fiber Bragg grating (FBG) sensor interrogator, construct a system model, test platform including embedded FBG sensors and develop signal processing algorithms to identify and measure AE signals in the presence of a quasi-static background strain field. The system model will demonstrate proof-of-principle and the test results will provide proof-of-functionality of the proposed sensor system for monitoring AE including using the advanced fiber optic sensor signal processing algorithms. AE will be simulated in an Aluminum by performing pencil break or impact hammer tests. The model test results will be compared to the measurements made concurrently by a standard single channel piezoelectric AE transducer. IFOS and its collaborators in this project will develop a Phase II strategy plan that includes development and integration strategy, potential demonstration opportunities, program schedule, and estimated costs. The key proposed innovation is a modular, light-weight, ultra-high-speed, multi-channel, optical fiber sensor system for AE monitoring.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Intelligent Fiber Optic Systems Corporation	Lead Organization	Industry	Santa Clara, California
Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California

Primary U.S. Work Locations
California

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/138786)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Intelligent Fiber Optic Systems Corporation

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

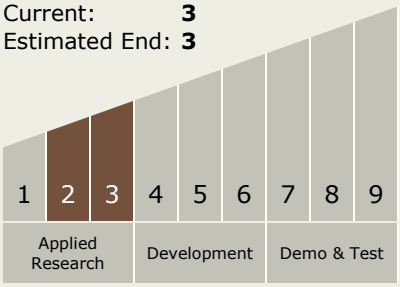
Carlos Torrez

Principal Investigator:

Vahid Sotoudeh

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.3 In-Situ Instruments and Sensors
    - TX08.3.5 Electromagnetic Wave Based Sensors

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System